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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/736,283	12/15/2003	Francois-Xavier Musalecm	1488/12/2	4294
25297	7590	06/30/2006	EXAMINER	
JENKINS, WILSON, TAYLOR & HUNT, P. A. 3100 TOWER BLVD SUITE 1200 DURHAM, NC 27707			DICKEY, THOMAS L	
			ART UNIT	PAPER NUMBER
			2826	

DATE MAILED: 06/30/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary	Application No. 10/736,283	Applicant(s) MUSALEM ET AL.	
	Examiner Thomas L. Dickey	Art Unit 2826	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 June 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 7-14,16,17,19-53,55,56,58,59,61,63-143 and 145-147 is/are pending in the application.
- 4a) Of the above claim(s) 27-45,64-79,94-140 and 145 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 7-14,20-26,46-53,55,58,59,61,63,80-93 and 141-143 is/are allowed.
- 6) ☒ Claim(s) 16,17,19,56,146 and 147 is/are rejected.
- 7) ☒ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 May 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

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DETAILED ACTION

1. The amendment filed on 06/09/2006 has been entered.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

Claims 16,17, 19, and 56 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claims 16 and 17, line 1, "claim 1" has no antecedent basis.

In claim 56, line 1, "claim 54" has no antecedent basis.

Correction is required.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 146 and 147 are rejected under 35 U.S.C. 103(a) as being unpatentable over XU ET AL. (6,441,449) in view of VOLANT ET AL. (6,798,029).

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A. With regard to claim 146 Xu et al. discloses a micro-electro-mechanical system (MEMS) variable capacitor with first 125 and second 127 actuation electrodes being spaced apart, and at least one (127) of the actuation electrodes being movable with respect to the other 125 actuation electrode when a voltage is applied across the first 125 and second 127 actuation electrodes; wherein the first 125 and second 127 actuation electrodes are composed of doped polysilicon, a material selected from the group consisting of metal, semi-metal, doped semiconductor, and combinations thereof; a first capacitive electrode 131 attached to and electrically isolated from the first actuation electrode 125; a second capacitive electrode 132 attached to and electrically isolated from the second actuation electrode 127 and spaced from the first capacitive electrode 131 for movement of at least one 132 of the capacitive electrodes in a substantially straight direction with respect to a normal of a surface of the other 131 capacitive electrode upon application of voltage across the first 125 and second 127 actuation electrodes to change the capacitance between the first 131 and second 132 capacitive electrodes; and a substrate 110 attached to the second actuation electrode 127 and the second capacitive electrode 132. Note figure 10 of Xu et al. Xu et al. does not disclose that the second capacitive electrode is buried in the substrate.

However, Volant et al. discloses a MEMS variable capacitor with a stationary (second) capacitive electrode 50 buried in a substrate 20 by, for example, damascene process. Note figures 5 and 6 of Volant et al. Volant et al. specifically tout the burying of the electrode 50 as an improvement over what they identify as a "prior art" electrode 2

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in their figures 3 and 4. According to Volant et al., burying the capacitive electrode allows one to place the flexible beam (part #1 in figures 3 and 4) closer to the substrate. This in turn allows the beam to be deflected by a smaller voltage applied to the actuation electrode (part #3 in figure 3) Note column 2 lines 49-60. Therefore, it would have been obvious to a person having skill in the art to replace the second capacitive electrode of Xu et al.'s MEMS variable capacitor with the second capacitive electrode buried in the substrate such as taught by Volant et al. in order to place the flexible beam (Xu et al.'s part # 140) closer to the substrate to thus allow the beam to be deflected while applying a smaller voltage to the actuation electrodes.

B. With regard to claim 147 Xu et al. discloses a micro-electro-mechanical system (MEMS) variable capacitor with first 125 and second 127 actuation electrodes being spaced apart, and at least one (127) of the actuation electrodes being movable with respect to the other 125 actuation electrode when a voltage is applied across the first 125 and second 127 actuation electrodes; a first capacitive electrode 131 attached to and electrically isolated from the first actuation electrode 125; a second capacitive electrode 132 attached to and electrically isolated from the second actuation electrode 127 and spaced from the first capacitive electrode 131 for movement of at least one 132 of the capacitive electrodes in a substantially straight direction with respect to a normal of a surface of the other 131 capacitive electrode upon application of voltage across the first 125 and second 127 actuation electrodes to change the capacitance between the first 131 and second 132 capacitive electrodes; and a substrate 110 attached to the

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second actuation electrode 127 and the second capacitive electrode 132. Note figure 10 of Xu et al. Xu et al. does not disclose that the second capacitive electrode is buried in the substrate.

However, Volant et al. discloses a MEMS variable capacitor with a stationary (second) capacitive electrode 50 buried in a substrate 20 by, for example, damascene process. Note figures 5 and 6 of Volant et al. Volant et al. specifically tout the burying of the electrode 50 as an improvement over what they identify as a “prior art” electrode 2 in their figures 3 and 4. According to Volant et al., burying the capacitive electrode allows one to place the flexible beam (part #1 in figures 3 and 4) closer to the substrate. This in turn allows the beam to be deflected by a smaller voltage applied to the actuation electrode (part #3 in figure 3) Note column 2 lines 49-60. Therefore, it would have been obvious to a person having skill in the art to replace the second capacitive electrode of Xu et al.’s MEMS variable capacitor with the second capacitive electrode buried in the substrate such as taught by Volant et al. in order to place the flexible beam (Xu et al.’s part # 140) closer to the substrate to thus allow the beam to be deflected while applying a smaller voltage to the actuation electrodes.

Response to Arguments

4. Applicant's arguments with respect to claims 146 and 147 have been considered but are moot in view of the new ground(s) of rejection.

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Allowable Subject Matter

5. Claims 7-14, 20-26, and 141 are allowed over the references of record because none of these references disclosed or can be combined to yield the claimed invention such as a micro-electro-mechanical system (MEMS) variable capacitor, comprising: (a) first and second actuation electrodes being spaced apart, and at least one of the actuation electrodes being movable with respect to the other actuation electrode when a voltage is applied across the first and second actuation electrodes; (b) a first capacitive electrode attached to and electrically isolated from the first actuation electrode; and (c) a second capacitive electrode attached to and electrically isolated from the second actuation electrode and spaced from the first capacitive electrode for movement of at least one of the capacitive electrodes in a substantially straight direction with respect to the other capacitive electrode upon application of voltage across the first and second actuation electrodes to change the capacitance between the first and second capacitive electrodes. (d) a movable component attached to the at least one movable actuation electrode and the movable at least one movable capacitive electrode, wherein the movable component comprises a first and second portion, wherein the first portion is positioned further from the first actuation electrode than the second portion, wherein the first actuation electrode is attached to the First portion of the movable component, and wherein the first capacitive electrode is attached to the second portion of the movable component, wherein the distance between the actuation electrodes is larger by a factor

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of three or more than the distance between the capacitive electrodes, as recited in claim 7.

6. Claims 46-53,55,58,59,61,63, and 142 are allowed over the references of record because none of these references disclosed or can be combined to yield the claimed invention such as a micro-electro-mechanical system (MEMS) variable capacitor, comprising: (a) a movable component being movable with respect to a surface of a substrate and comprising a first and second portion, wherein the first portion is positioned further from the surface of the substrate than the second portion; (b) first and second actuation electrodes being spaced apart, wherein the first actuation electrode is attached to the first portion of the movable component, wherein the second actuation electrode is attached to the substrate, and wherein the first actuation electrode is movable in a substantially straight direction with respect to a normal of a surface of the second actuation electrode when a voltage is applied across the first and second actuation electrodes; (c) a first capacitive electrode attached to the second actuation electrode; and (d) a second capacitive electrode attached to the second portion of the movable component and spaced from the first capacitive electrode for movement of the first capacitive electrode with respect to the second capacitive electrode upon application of voltage across the first and second actuation electrodes to change the capacitance between the first and second capacitive electrodes, wherein the substrate is attached to the second actuation electrode and the second capacitive electrode and the second actuation electrode is buried in the substrate, as recited in claim 46.

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7. Claims 80-93 and 143 are allowed over the references of record because none of these references disclosed or can be combined to yield the claimed invention such as a micro-electro-mechanical system (MEMS) variable capacitor, comprising: (a) first and second actuation electrodes being spaced apart, wherein the first actuation electrode is movable with respect to the second actuation electrode when a voltage is applied across the first and second actuation electrodes; (b) a first capacitive electrode attached to the first actuation electrode; and (c) a second capacitive electrode attached to the second actuation electrode and spaced from the first capacitive electrode for movement of the first capacitive electrode with respect to the second capacitive electrode upon application of voltage across the first and second actuation electrodes to change the capacitance between the first and second capacitive electrodes, wherein the capacitive electrodes are spaced closer to one another than the actuation electrodes, wherein the distance spacing the capacitive electrodes is one-third or less than the distance spacing the actuation electrodes, as recited in claim 80.

8. Claims 16,17,19, and 56 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112 set forth in this Office action.

Conclusion

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thomas L Dickey whose telephone number is 571-272-1913. The examiner can normally be reached on Monday-Thursday 8-6.

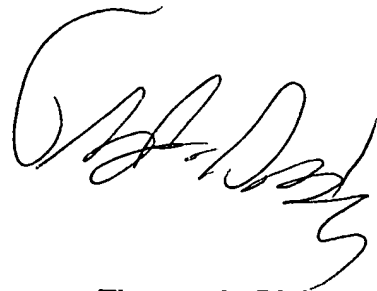
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thomas L Dickey whose telephone number is 571-272-1913. The examiner can normally be reached on Monday-Thursday 8-6.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan J Flynn can be reached on 571-272-1915. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For

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more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'T. L. Dickey', with a stylized flourish at the end.

Thomas L. Dickey
Patent Examiner
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06/06